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DUAL-RANGE IMPEDANCE METER

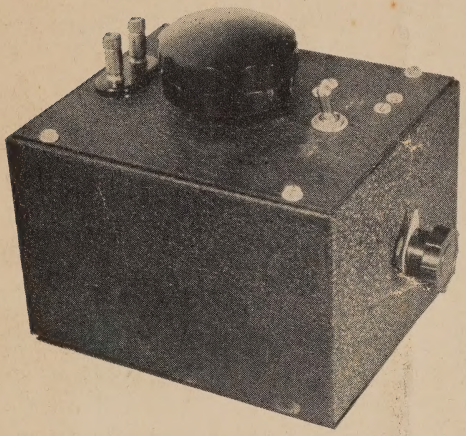

Fig. 1. Dual-Range Impedance Meter. The large center knob adjusts the ganged rheostat. The small finger-grip knob is for the test switch. See Figure 4 for identification of parts and layout.

A standard arrangement for the simple measurement of impedance is shown in Figure 2. In this circuit, which is used often in laboratory-bench setups, an unknown impedance Z (shown here as a coil, although it might also be a capacitor) is connected in series with a calibrated resistance R. An a. c. voltage of suitable frequency is applied to R and Z in series. An a. c. vacuum tube voltmeter is arranged with a single-pole, double-throw switch so that it can be used at will to check the voltage across either R or Z. In operation, the switch is thrown successively between its position 1 and position 2, while R is adjusted over its range. When there is no further change in the voltmeter reading as the switch is thrown back and forth, the voltage drop across R equals the voltage drop across Z. At this point, R is equal to Z. The value of the unknown impedance (Z) accordingly can be read directly in ohms from the setting at this point of the calibrated resistance, R. The variable resistance usually is a standard decade box or is a rheostat fitted with a dial reading directly in ohms.

While servicemen and other technicians with limited instrument budgets long have appreciated the merits of this impedance measuring scheme for checking voice coils, chokes, transformers, capacitors, and other components, there has been some objection to the circuit because few servicemen possess the facilities or have the time to calibrate the variable resistance and draw up a direct-reading ohms scale. Also, until comparatively recently, few operators in this category have owned a. c. - type v. t. voltmeters.

The present situation is changed by the fact that many servicemen now have a. c. probes, either crystal or tube, for their d. c. v. t. voltmeter-ohmmeters. The impedance-measuring

instrument described in this article utilizes the a. c. v. t. voltmeter ranges for adjustment of the impedance meter circuit and uses the ohmmeter ranges of the v. t. voltmeter to indicate the resistance setting of the variable resistor. Thus, a calibrated dial is not required — the unknown impedance being read directly from the ohmmeter scale. Use of the instrument for measuring impedance is reduced to this simple procedure: (1) The a. c. v. t. voltmeter is switched successively across the unknown impedance and the variable resistor. (2) The resistor is

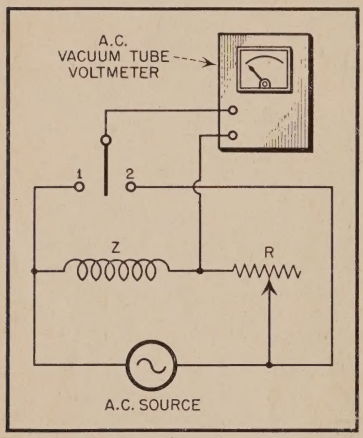

Fig. 2. Basic Impedance Meter Circuit.

adjusted until the voltages across R and Z are equal. (3) The signal voltage to the impedance meter circuit then is switched off, and the ohmmeter is connected across the resistor only to read the ohms at that setting. The ohmmeter reading then indicates the unknown impedance.

In this form, the impedance meter requires neither a self-contained v. t. voltmeter (which would be tied up unnecessarily) nor a calibrated dial. Furthermore, it allows use of standard, inexpensive volume-control-type rheostats without the worry that wear in these components will make it impossible to repeat the dial settings accurately.

Complete Circuit

An examination of the complete circuit diagram, Figure 3, will show how the results are accomplished.

Two variable resistors are provided — R_1 100 ohms, and R_2 10,000 ohms. These rheostats comprise a dual unit adjusted by means of a common shaft. Switch S_2 permits selection of either the 100-ohm rheostat for the low-impedance range or the 10,000-ohm unit for the high-impedance range. By using two separate variable resistances, low impedance values may be determined more closely than with a single high-resistance unit. The dual 100-10,000-ohm rheostat-potentiometer is obtainable as a regular I. R. C. unit.

The unknown impedance is connected to the terminals labelled X-X. When making adjustments, the a. c. v. t. voltmeter is plugged into jack J_1. The a. c. signal is fed into the instrument circuit through a shielded cable plugged into jack J_3.

For testing most audio-frequency components, the signal voltage should have a frequency of 400 or 1000 cycles. This voltage can be taken from an audio oscillator, which now also is a standard piece of equipment in radio shops. A great deal of impedance checking can be done at 60 cycles, as well. A satisfactory voltage of this frequency can be supplied by a 2½-volt filament transformer operated from the power line. Specific directions for operation of both the oscillator and 60-cycle source are given later in this article.

When the ohmmeter is plugged into jack J_2, the a. c. signal voltage is interrupted automatically by the auxiliary contacts of the jack. This pre-

vents accidental application of a. c. to the ohmmeter.

Construction

Figure 1 shows the completed unit. Figure 4 is a layout sketch, showing placement of components and controls. It is not necessary to adhere strictly to this arrangement of parts, since the impedance meter is not critical as to layout.

The instrument, as shown, is built in a metal radio "utility" box, 6" long, 5" wide, and 4" high. The ganged variable resistor, R_1-R_2, is adjusted by means of the knob seen in the center of the top panel (Figure 1). This is a large 2⅜"-diameter knob (National HRK) which permits smooth, close setting of the rheostats. The terminals, X-X, for the unknown impedance are the two binding posts mounted in front of the knob and insulated from the metal box by the bakelite mounting block which holds them. The metal posts and insulating block are obtainable as National type FWH assembly.

The test switch, S_1, is a single-pole, single-throw bat handle toggle switch mounted just back of the adjusting knob. The High-Low impedance range switch, S_2, is mounted on the

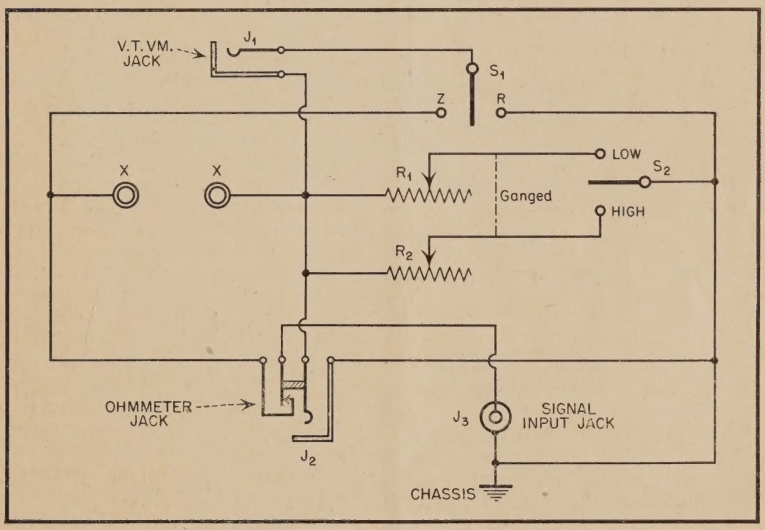

Fig. 3. Complete Circuit of Impedance Meter.

List of Parts Used in Dual-Range Impedance Meter

J_1—Midget open-circuit phone jack—Utah 501

J_2—Midget jack with separate break contacts—Utah 505

J_3—Concentric female chassis jack—Amphenol 80-C

R_1-R_2—Dual 100-10,000-ohm ganged rheostat-potentiometer—I. R. C.

S_1—S. p. d. t. bat handle toggle switch—Bud 1297

S_2—S. p. d. t. rotary switch—Bud 499

front panel of the instrument case and is adjusted by means of the finger grip knob seen in Figure 1. This is a rotary type switch (Bud No. 499). The two meter jacks, J_1 and J_2, are mounted on the right-hand panel of the case (See Figure 4) and are not visible in Figure 1. The signal input jack, J_3, is mounted on the front panel of the case (See Figure 4).

The ohmmeter jack, J_2 has a pair of auxiliary contact springs which open

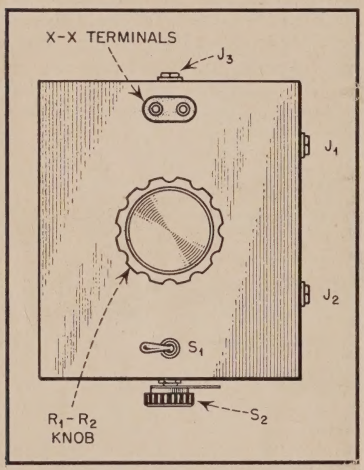

Fig. 4. Top Layout, Impedance Meter.

when the meter plug is inserted and break the signal input leads. This miniature jack is Utah No. 505. Jacks J_1 and J_2 are insulated from the metal case, J_3 is grounded to the case.

Rigid No. 14 bus bar is used for the wiring, in order to prevent shifts due to movement of leads. All leads must be kept as short as possible.

Operation

(1) Connect the unknown impedance to terminals X-X. Use the shortest possible connecting leads. (2) Plug the lead from the signal source (audio oscillator or filament transformer output) into jack J_3. Set the a. c. signal voltage to 0.1 volt when switch S_2 is in its "Low" position, and to between 1 and 5 volts when S_2 is in its "High" position. If the signal is obtained from the 2½-volt winding of a filament transformer operated from the a. c. power line, some means, such as a Variac or power-type rheostat, must be provided for adjustment of the signal voltage. (3) Set the a. c. v. t. voltmeter to its 1-volt range (or to the range on which 1 volt normally is read) and plug meter into jack J_1. (4) Set switch S_2 to its "Low" position. (5) Set switch S_1 to position Z. Note voltmeter reading. (6) Throw S_1 to its R position, and adjust the rheostat knob to make meter read same voltage as when S_1 was in the Z position. (7) Throw S_1 back to Z and readjust the rheostat knob for the same voltage reading. (8) Jockey back and forth between the R and Z positions of S_1 until the meter does not change reading when S_1 is thrown from one position to the other and the rheostat requires no further adjustment. If this stationary voltage reading is not obtained, throw switch S_2 to its "High" position and repeat steps 5, 6, 7, and 8 until the meter does not change reading. To increase sensitivity, the signal input may be increased (between 1 and 5 volts) and the voltmeter range changed accordingly. (9) When the meter reading is stationary, remove the meter plug from jack J_1. Switch the meter to its ohmmeter range, and insert the meter plug into jack J_2. Read the unknown impedance value from the ohmmeter scale.

Although this dual-range impedance is inexpensive and easy to build, it will be found quite useful in spite of its simplicity. It is practically foolproof and will give long service without maintenance.

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WANT—Precision tube checker, generators, RCL bridge, tape recorder, etc. Have surplus equip., generators, etc. John Graham, Wurtsboro, N. Y.

FOR SALE—Riders manuals 1-9, very good condition, prepaid $60; output meter, $2; various old type tubes; Motorola 400, $20. Write for list. Ellis Radio Service, P.O. Box 63, Vermilion, Ohio

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WANT—Transmitting, special-purpose and new receiving type tubes. B. N. Gensler, 136 Liberty St., New York 6, N. Y.

SWAP—RCA FAX receiver, 6 packs Ansco 4 x 5 color film, 8 x 10 Weston photo cell and Weston Microrelay, works of cell directly. Want Ham photo or 16mm gear or films. Leo Meister, 1526 Schley St., Hillside, N. J.

WANT—Professional recording equipment. State make and prices of amplifiers, cutting lathes, etc. Want Subraco mobile 10 meter rig. W. L. Godden, 504 Norton, Kansas City, Mo.

FOR SALE—Used Bendix 100 watt TA-12 transmitter with 4 separate 12SK7 ECO's, 1-807 power amplifier, 2-807s in output stage, good shape, $40. Russ Kilmer, P.O. Box 367, Fort Plain, N. Y.

FOR SALE—Rider P. A. manual, $13.50; Ghirardi Radio Physics, $3.50; Modern Radio Servicing, $3.50; Trouble-Shooter Handbook, $3.50; postpaid, good cond. V. R. Hein, 418 Gregory St., Rockford, Ill.

WANT—Amplifier to run off car battery. To be used in Gospel work. Rev. H. D. Skelton, 4103 Denley, Dallas, Tex.

WANT—8 or 16mm movie camera, late model. Will trade Masco MA-10EX HI-FI amplifier with Woofer, Masco Tweeter, 3 speed phono., like new. P. S. Optner, 135-12 78th Dr., Kew Gardens Hills, N. Y.

FOR SALE—Model 534 Hickok tube tester, analyzer; model 900 Vomax, both good cond. Will ship collect to highest offer. G. L. Anderson, P.O. Box 667, Oakdale, Calif.

WANT—Coil assembly covering 600 meters for National HRO 5TA1 receiver. Coil covers about 180 kc to 430 kc. Need coils for 100-200 kc, 50-100 kc. T. F. Rowan, 4013 Franklin Ave., New Orleans, La.

TRADE—Precision E-200-C and 920P tube, battery, circuit tester, both in new cond.; new Astatic (AT-1) TV booster. Need a Harvey-Wells TBS-50D in trade for all. A. L. Guide, 17 Wolcott St., Malden 48, Mass.

FOR SALE—UTC output transformer LS-54, primary, P. to P.-8000 ohms; secondary, 30-1.2 ohms, 15 w., 7.5 lbs., $7.50. Barton Koslow, 515 West End Ave., New York, N. Y.

SELL OR SWAP—Triplett sig. gen., like new, model 2432 with instruction book, $60. Want radio equip. or gem cutting equip. B. H. Buchanan, Hawk, N. C.

FOR SALE—RME-45 with speaker, both in perfect condition, $85. D. E. Kellogg, 56 Terrace Heights, Katonah, N. Y.

FOR SALE—Precision E-400 TV, sig. gen. Almost new, complete with instructions, test leads, $80. Johnson Radio Service, 7612 Calif. Ave., Huntington Park, Calif.

WANT—.22 cal. pistol. Will trade for radio parts. Joe Cooper, 1096 W. Farms Rd., Bronx 59, N. Y.

FOR SALE—Fine used (Standard) radio chassis of all makes. Forward 3c stamp for bulletin. Goldstone Radio, 1279 Sheridan Ave., Bronx 56, N. Y.

FOR SALE—Viewtone 7" TV set with built-in radio, consolette model, A-1 condition, receives channels 2, 4, $75. 2 Navy surplus volt ohm meters, $25 for both. Mike Sunday, 4637 Chene, Detroit 7, Mich.

FOR SALE — Triplett model 2405 VOM Square Line type, used 2 yrs., perfect cond., best cash offer. Deliver within 25 miles. W. Hogan, 2321 Ardmore Terrace, Winston Salem, N. C.

POSITION WANTED—Holder of first class radio telephone operator's license wants position anywhere in U. S. Graduate of R.C.A. Institutes. Romeo Thibodeau, 200 Oak St., Holyoke, Mass.

FOR SALE—Eico VTVM model 221, factory assembled, seldom used, needs adjustment or repair to stop drift. Best offer. Leonard Matushefske, 2 Elmont Rd., Elmont, L. I., N. Y.

SELL OR TRADE—8 tube portable AC-DC Zenith-Transoceanic radio, $65, or trade for tube-battery tester, sig. tracer, volt millmeter, all good condition. Walts Radio Service, 374 St. Paul St., Burlington, Vt.

WANT—Complete correspondence course in electricity. Must be recent course. E. W. Reininger, 148 Willow Ave., New Braunfels, Tex.

WANT—Old and unusual radios, before 1928 preferred. Must be complete but not necessarily in operating condition. Cash or trade but not high price. W. H. Miller, 1017 Westgate, Troy, Ohio

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SELL OR TRADE—Late course in Radio TV and Servicing by De Forest, with all questions, etc. Want ham receiver or portable tube checker or what have you. Bynum's Radio Service, 1111 Ten Eyck St., Jackson, Mich.

SELL OR TRADE—.22 cal. rifle, used just once, 6 shot clip included. Would like SM-40 meter or will sell for $25. J. A. Muise, Jr., P.O. Box 354, Gloucester, Mass.

FOR SALE—3" Espey TV kit, in fine working order, no cabinet, contains 18 tubes including 3KPI picture tube, also instruction book, $30. Picture tube alone cost $15. I. Weinberg, 1547 Longfellow Ave., Bronx 60, N. Y.

FOR SALE—IRE Proc, 1929-1949; QST, 1924-1942; Radio, 1926-1940; Radio Broadcast, 1927-1930; Radio Digest (issue 2 only); Radio Engineering, 1930-1932; etc. A. B. Newhouse, 817 James Court, Wheaton, Ill.

FOR SALE—Riders manuals 1-13, perfect condition. Make reasonable offer. Bernard Shulman, 88 Nye Park, Rochester 21, N. Y.

FOR SALE—Hallicrafter HT12, 10 channel marine radiophone with 12 v. power supply, $75; 32' cabin cruiser (sleeps 6), $950; NC101XA, $100, 10 mtr. xmitter T-40 final, $35. G. W. Leahy, Spring Lake, Mich.

FOR SALE—Like new Sound Projector, complete; Supreme 504B tube tester; Hallicrafter 7" TV set; pocket tester; TV sweep generator, scope. Make offer. Franz Radio-Vision, 1527 Liberty St., Erie, Pa.

WANT—Portable electronic flash unit that may be used either with wet-cell batteries or regular electric current. Hank De Lorme, 650 Ridgewood Rd., Oradell, N. J.

SELLING OUT—Thordarson choke and output, Trans. Chicago high fidelity output trans., RCA miniature tubes, resistors, Kennedy mach. tool box metal, etc. J. Holloway, Box 133, Haddonfield, N. J.

FOR SALE—Riders manuals, books, Sears manuals, Gernsback manuals, books, drafting instruments, electrical books, courses. Want 5" oscillograph. Super Radio Service, 56 Carey Ave., Wilkes-Barre, Pa.

SELL OR TRADE—Battery type portable radio, tube tester transformer, misc, parts, hardware. Want sig. or sweep gen. Write for list. Alfred Kenna, 53 Madison Ave., Roosevelt, L. I., N. Y.

WANT—Riders manuals, 11-13. Write regarding price, condition. Ryall's, 86 S. 69th St., Upper Darby, Pa.

FOR SALE—Model 534 Hickok dynamic mutual conductance tube tester and analyzer, used very little, has a metal carrying case, $100. Also Supreme sig. generator, make offer. George E. Mallams, Weir, Kan.

FOR SALE—Radio, appliance sales and service business, $4000, includes all stock, fixtures, books, equipment. Low rent. Must sell because of illness. Steve's Radio Service, 53 Glenwood Ave., Binghamton, N. Y.

TRADE— UTC linear standard input or interstage for similar output (5,000 ohm). Also back copies IRE, Electronics, QST, Radio News for? Robinson, 3647 Main, Kansas City 2, Mo.

FOR SALE—G-I 78 and 33 1/3 rpm recorder with magnetic cutter, nylon pickup, $24.50; Webster 156-27 changer on metal base with G.E. cartridge, $22.50, etc. J. N. Lafreniere, 129 Natick Ave., Warwick, R. I.

FOR SALE—Meissner deluxe signal shifter, like new condition, complete with tubes, coils for doubling into 10 meter band. Bargain at $27.50 plus shipping postage. J. L. Grasse, 1109 S. Lake St., Apt. 308, Los Angeles 6, Calif.

WANT—Good AM-FM tuner or radio with tuned r. f. stage. Also .22 Walther PPK pistol. Have cash, Wilcox receiver, amplifier, meters, tubes. P. H. Trautwein, 40-25 206 St., Bayside, N. Y.

POSITION WANTED—Holder of 2nd class radio-telephone operators license desires part or full-time position, between 2 P.M. and midnights in N. Y. C. Now at radio-electronics school. Salary secondary. A. J. Amodeo, 1549 68 St., Brooklyn, N. Y.

FOR SALE—Precision volt-ohm-millemeter S-856; Precision sig. gen., series E-200; Precision tube tester, series 912; NRI radio course, 110 asst. radio tubes; 1-40 Sams, etc., $260. George Holy, Jr., 612 Oak St., Highlands, Tex.

FOR SALE—New 1950 model 745-16" Hallicrafter TV with black rectangular tube, $279.95 plus shipping charges, excellent cond.; complete McGraw Hill Radio-Engineering Library, $24.50, etc. W. A. Voelker, Marine on St. Croix, Minn.

SWAP—Have copy of "Radio Test Instruments" by Turner and "How to Service Radios with Oscilloscope" to trade for copy of "Modern Radio Servicing" by Ghirardi. Pat Blaney, New Straitsville, Ohio

FOR SALE—Dumont 224-A wide band oscillograph with probe, used very seldom, $185. Philco lp record player (new) in carton, $18. Paul Wunsch, Jr., 421 Clifton Ave., Clifton, N. J.

WANT—Pair of American or German made binoculars. Must be in good condition. Will trade RCA test equip., RCA 156-D tube tester, RCA 153 sig. gen, all new in 1940. D. J. Gauthier, Tupper Lake, N. Y.

TRADE OR SELL—60 w. CW xmtr., $60; 5" Heathkit scope, $30, or will trade both for like new NC57 receiver or mobile 20-50 w. fone xmtr. E. Matthews, 171-35 Courtney Ave., Flushing, N. Y.

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WANT—Stromberg Carlson No. 68 all-wave receiver P-24420 amplifier chassis 50-60 cycles. Selector assy. not needed. Will pay reasonable price. L. M. Schaeffer, Market & Allen Sts., Royalton, Pa.

FOR SALE—Transvision 5 channel 7" TV, complete, only antenna needed; with spare tubes (includ. picture tube), $30. Local buyer preferred. John Uscin, 15 Myrtle St., Yonkers 3, N. Y.

TRADE — Want TV test equipment. Will trade new radio tubes, TV (new), picture tube, some used meters. M. Leitch, 34 Park Dr., West Orange, N. J.

POSITION WANTED—Graduate radio engineer with experience in radio service and operating sound, movie, recording equip. Can qualify for federal license. Will go anywhere. Bill Fondren, R No. 2, Box 307, Springfield, Mo.

SWAP—Trade your Model A Ford or typewriter for Pilot model T-511 with short-wave. Offer you reductions on all periodicals by subscription; ham call cards, anything printed. Ray Bartlett, 106 Thomas Place, Yonkers, N. Y.

FOR SALE—Radio Operating Q & A, 9th and 10th edition, by Nilson and Horning. Both slightly used, still in jackets. Will consider a swap for radio gear. Howard L. Langston, 1008 W. 3rd St., Eugene, Oregon.

WANTED—February, 1950, copy in good condition, of Radio Service Dealer Magazine. Send postal card first for 50 cent payment. R. Cooper Bailey, Box 112, Richmond 1, Va.

SWAP—Printing work, letterheads, cards, etc., for radio parts, tubes, etc. V. Johannes, 1541 Metropolitan Ave., Bronx 62, N. Y.

FOR SALE—B C 348 C receiver, $50; SCR 522, $25. These items have not been converted. Paul Ruckert, 4416 Buena Vista Ave., Baltimore 11, Md.

FOR SALE—Brush Sound Mirror model B.K. 401 tape recorder in very good condition, $60. Roland Gagnan, 205 Brightman St., Fall River, Mass.

FOR SALE—7" Transvision TV set, in good condition with magnifier. Complete set of new tubes, including picture tube. Make offer. Greiner Radio Service Co., 299 South Elmwood Ave., Buffalo, N. Y.

SELL OR TRADE—Sams Record Changer; Recorder Manual, $4.50; used postcard mimeograph machine, automatic feed, $4; $75 multitester, excellent cond., very cheap. Want Kelsey 5 x 8 or 3 x 5 press, type. Edward C. Allmon, 375 Holman Ave., Athens, Georgia.

FOR SALE—Riders manuals 1-14 (2-14 are like new). No reasonable offer refused. A. & B. Radio Laboratory, Burlingame, Calif.

FOR SALE—Perfect copy of "Radio Data Book" by Boyce and Roche, $2.50. First come, first served. Leon Medler, 2109 Daly Ave., Bronx 60, N. Y.

POSITION WANTED—Salesman with electrical chemical college education. Barth Radio and TV, 333 Washington, Chelsea, Michigan.

TRADE—Viewtone television set for Precision signal generator, model E-200-C or 4 x 5 camera with flash shutter with good lens. Have cash and other trades. John Arnold, P.O. Box 84, Bluffs, Ill.

TRADE—Waller Communicator trans., less power supply and ant., excellent cond. Want 5" Heathkit oscilloscope or similar. L. Petry, 1050 Lake Jackson, Tallahassee, Florida.

POSITION WANTED—I am 19, 3 years European Radio Servicing background, now TV school grad. Want to start as TV maintenance trainee in New York or Brooklyn. R. Weinstein for Jacob, 4217 16 Ave., Brooklyn, N. Y.

WANTED—Used 150mc FM equipment for mobile service. State lowest price. M. L. Bardfield, 4 Brinsley St., Boston 21, Mass.

FOR SALE—Rider's TV vols. 1, 2, 3, complete with additions, index each vol., total index; also "How It Works," Sam's Antenna Book, TV Photofact 76, Photofact TV course. Perfect. $45 all. Lillian Marks, 17 Stuyvesant Oval, New York 9, N. Y.

FOR SALE—Precision E-200-C, used 15 hrs, $55; Hickok 532 P tube tester, $95; Eico VTVM completely wired, perfect cond., with R.F. probe, $30; Ghirardi's Physics course, $2; Marcus Practical Radio Servicing, $2. Joseph Sovina, 432, Beaumont St., Warrior Run, Pa.

TRADE—Test equipment, radio parts, 7" TV set, 10" TV set, tubes. Will trade for what have you? Send for list. Send your list. C. Bufano, 185 No. 15th St., Bloomfield, N. J.

WANTED—Gardiner Code Machine, model "S," and tapes, also audio oscillator. Send card stating condition and price. A. J. Cox, Jr., P.O. Box 579, Buffalo 5, New York.

TRADE—BC221-N frequency meter, excellent condition complete with tubes, crystal, metal cabinet and original calibration chart. Want TV set in good operating condition with or without cabinet. Fred Lingel, 712 Sumner Ave., Syracuse 10, N. Y.

FOR SALE—Precision E-200 signal gen. and 912 Electronamic tube tester. Current models and fairly new. Also a Signal Corps surplus radio tool chest. Any reasonable offer. Howard Katzman, 1505 Macombs Road, Bronx, N. Y.

FOR SALE—Dumont cathode ray oscilloscope, type 224A with probe, excellent, retails for $290, shipped by express to you for $150. W. T. Osborne, 887A So. Zeigler, Warner Robins, Ga.

FOR SALE—Rider's Manuals, 1-5 abridged, 6-14, excellent condition, $110 for complete set. Henry Van Loon, 1132 Norton, Rochester 21, N. Y.

WANTED—Rider's Manual No. 5. Have for sale or swap, Rider's No. 1-5 abridged, in fine condition. Ray Garfield, 1512 Mission St., Santa Cruz, Calif.

FOR SALE—Matched pair Walkie-Talkies, model M.A.B. - 2952kc, complete with microphone, earphones, aerials, and new batteries. Don R. York, P.O. Box 164, Upper Lake, Calif.

FOR SALE—10HP4 Electrostatic tube, $10. Local sale only. N. Melancon, 140-71 Ash Ave., Flushing, N. Y.

WILL TRADE—Radio receiver RAO-3. Similar to National's 100XA, but has two stages of R.F. and covers .55mc to 31mc. Want a good 7" or 10" TV set. D. J. Platsis, 910 W. San Tomas, Campbell, Calif.

TRADE—Printing of all kinds for radio, television, phonograph, recorder, and parts. Also want photographic material or anything of value. Write me what you have and what kind of printing you want. Carl Schwartz, 134 Penn St., Brooklyn 11, N. Y.

FOR SALE—1 H.V. power supply unit 28 to 40 K.V. and 1 RCA 5TP4 tube, both used for projection television 70 hours. E. W. Noli, 79 Madison Ave., New York City.

FOR SALE—A good Radio Repair-Service and Sales business. Complete latest type test equipment. Take cash or property. What have you? Red's Radio Service, 420 Main, Texarkana, Texas.

FOR SALE—Precision Series 954-G Electronic tube and set tester. Tests to 6000 volts ac or dc. 20,000 ohms per volt. Also tests micro-amps and amps. Resistance to 60 meg. ohms. Best offer. Morris R. Wilson, 623 Oxford St., Belvidere, New Jersey.

SELL OR TRADE—Westinghouse communication receiver; Oliver typewriter with cleaning and repairing tools; and self-developing camera. What have you? Norman LaCroix, 21 Mavis St., Pawtucket, R. I.

SELL OR TRADE—Heathkit 5" oscilloscope, perfect, $26; Telekit 12 channel tuners, perfect, $6. Nanifan Radio, 3003 121st St., Toledo, Ohio.

FOR SALE OR SWAP—Set Transvision transformers for 7" receiver; Stromberg-Carlson dynamotor 12V dc input 680V at .210 amps. output; ½ hp aircraft motor converted to ac 4000 rpm, adjustable speed and reversible, shunt or series connections, ½" shaft. Want .22 target pistol, cash, or what have you? C. B. Kelley, 7204 Clovernook Ave., Cincinnati 31, Ohio.

WANTED—TS-300 or similar frequency meter. Accuracy .005% at 155mc. Price and condition, first letter. J. B. Crawley, Campbellsville, Ky.

FOR SALE—5" oscilloscope complete with 5CPIA Cathode ray tube, never used. Also output meter and an alignment wand and loop antenna coupler. All A-1 condition. $65 takes all. Steve Toth, 6352 S. Fairfield, Chicago, Ill.

WANTED—Tube tester, signal generator, and other test equipment. Send details. H. Latko, 1922 Dickens, Chicago, Ill.

WANTED—Vibroplex or other good "bug," will pay cash. F. Michaelson, Coxsakie, New York.

FOR SALE—Army BC455-B receiver, 6 to 9.1mc, $5.50. J. R. Halverson, 600 Maycox Ave., Norfolk 5, Va.

WANTED—Metal case only for BC-221 frequency meter. Will trade commercial version of BC-221 freq. meter in excellent condition with crystal and original calibration book for VHF 152A or ? L. Dillin, 2445 N. Orchard Drive, Burbank, Calif.

TRADE—1,000 volt 2-section filter power supply on chassis for condenser checker, or what have you? P. J. Faulkner, 136-05 Sanford Avenue, Flushing, L. I., N. Y.

WANTED FOR CASH—1P25 "snooperscope" tubes. Also other types of special purpose tubes. B. N. Gensler, 136 Liberty St., New York 6, N. Y.

WANTED—1950 Royal quiet typewriter and $20. Will trade for Revere ($159) tape recorder or other items that I have. Will also sell at low price. John Moy, Box 169, Canal St. Station, New York 13, N. Y.

FOR SALE—Crosley 4 tube ac-dc small radio, good condition, $3; 3 tube Air Scout with plug-in SW coils, without headphones, $2, with phones, $3. Charles Cassel, Route 4, Irwin, Pa.

TRADE—Complete Presto-Weld, aircraft size welding torch, gauges, heads, hose, and adapters (almost new), for Sylvania 5" oscilloscope or scope of equal performance. No junk. Chuck's Radio Service, Clarinda, Iowa.

WANTED—Used or Junk auto radios. Send model, condition and price wanted, or will trade. N. W. Anderson, 1114 Idaho St., Norman, Okla.

FOR SALE OR TRADE—Shure 55C microphone, like new, 25' cable. Will trade for used Hallicrafters 38A or equivalent. Earl Randall, Trenton, S. C.

WANTED—Used signal generator, tube tester, VOM, VTVM, cond. tester, any other test equipment. Appreciate any radio technical books and mags. old or new. Illness broke me, your contributions appreciated. James Morse, Rt. 2, Box 85, Hammon, Okla.

SELL OR TRADE—UHF and VHF equipment, BC375, 453, 456, 458, 625. Dynamotors, HV vibrapaks, power supplies, HV supply parts. Hallicrafters S41-G Motorola car radio, Loran indicator. 5 x 7 and 9 x 12cm cameras, accessory photo equipment. A. Zambakian, 1259 Gaylord St., Denver 6, Colorado.

FOR SALE OR SWAP—Fixed-bias push-pull 2A3 amplifier with tubes and Jensen speaker, $10; 35mm projector, $9; test equipment; communications rec.; 110 dc to 110 ac genemotor. Want Riders, 18" Jensens, FM tuner, TV. Knight, 1000 S. Glendale Ave., Glendale 5, Calif.

FOR SALE—Two complete Mark II sets. All equipment as furnished the government — extras, spares, and one power supply for 110V ac. Used a few hours only, will ship express collect well-packed for $85. A. H. Mogensen, Lake Placid, N. Y.

SALE OR TRADE—BC-454-E Command receiver, 3-6mc., original carton, PE-120-B portable vib. pwr. supply, 6, 12, or 24V input, 90 and 145V output (for BC-659 or BC-620). Want small SW receiver, any condition, or cash. S. A. Campbell, 208 Jackson Ave., Schenectady 4, N. Y.

FOR SALE—Precision Series EV-10P VTVM meters with HF probe in hardwood portable case, complete, large 7" meters, $75. R. A. Dressler, 355 Front St., Millersburg, Pa.

SELL OR SWAP—Orpheum No. 3 tenor banjo, case; Brooks FM tuner; Meissner model 8C; King Saxaphone, case; Pan-American cornet, case; two nice electric clocks. All in good condition. Victor D. Letaurneau, Jr., 179 Main St., Holyoke, Mass.

SWAP—Surplus, cartoned and uncartoned tubes. Want audio, test, and recording equipment. Frank M. Bell, Post Office, Ludlow, Ill.

FOR SALE OR SWAP—Dynamic 7" television set complete with cabinet and in good condition. Also available with 12" tube 12GP7. M. Schwartz, 32-15 93rd St., Jackson Heights, L. I., N. Y.

FOR SALE—U.S.T. projection television set, 30" x 22", Schmidth System optical, all channel selector, 8 mos. old, perfect condition, $650 cash. H. M. Layden, 1435 York Ave., N. Y. C.

SWAP—Books on radio, electricity, and machine shop practice, for books on woodworking, carpentry, or painting. Morris Henner, 183 Ocean Parkway, Brooklyn 18, N. Y.

FOR SALE—Triplett all wave all purpose tester, model 1175-B; Readrite Ranger tube tester, model 432-A. Also NRI course with kits to conduct experiments, with instructions. Make offer. S. J. Horoman, 143 Manhattan St., Ashley, Pa.

FOR SALE—In good condition: Dumont scope No. 224, $140; BC-221 W mod., $75; Hickok 177X gen., $40. Professional Radio Service, 3035 Liberty Parkway, Dundalk 22, Maryland.

WANTED—Signal tests set 1-56, T33 microphone, BC1016, TS-69AP freq. meter, power pack for LM-7 original one. W. E. Schwenzer, 3614 Peach St., Erie, Pa.

FOR SALE—10BP4 and 10FP4's with 30 day guarantee for $8. Shipped prepaid. David Furnish, 5920 Elston, Chicago 30, Illinois.

FOR SALE—The first check or money order for $50 buys a Supreme model 576 sig. gen., 65kc. to 20.5mc., never used. Walter A. Seibert, 3 Madison Rd., Scarsdale, N. Y.

SWAP—Two 7" TTI television chassis complete and operating, need adjustment, 1 cabinet for same and one 7" enlarger. Want Rider's Manuals, radio or test equipment, or what have you? James J. Sullivan, 102 Swarthmore Ave., Folsom, Pa.

FOR SALE—Garrard record changer, 78 rpm. Needs some repair. Has crystal cartridge, $5. R. Lerner, 772 So. 19th St., Newark 3, N. J.

FOR SALE—Eicor model B-1968 rotary inverter, $25 FOB. R. R. Marshall, 3124 Humboldt Ave. South, Minneapolis 8, Minn.

SALE OR TRADE—Model Q high frequency speaker (Jensen) with reflector; Auditorium model "L" 13" speaker (110V ac) and filter unit model F5A. Also approved Electronic A-200 signal generator. Nick Barbieri, 735 E. 182nd Street, Bronx 57, New York.

FOR SALE—12 Jerrold television booosters Series B. Will sell all for $85 or $10 ea. Will ship prepaid. John P. Janosik, 507 4th St., Laurel, Delaware.

SWAP OR SELL—Have QST magazines from 1941 to 1947 in very good condition and Radio News special issues. Ten cents a copy or what have you in photographic equip. for the whole lot. Mario Cecconi, 1443 Overing St., Bronx 61, N. Y.

WANTED—Diagrams for BC-454, BC654, and BC375. Louis Plante, RFD Box 170, Manville, R. I.

SWAP—Late model battery radios, 47 Belmont, 50 Trutone and others. Want vacuum tube volt meter, oscilloscope, and parts. Homer Gibby, Hayesville, North Carolina.

FOR SALE—Hallicrafter SX43 receiver with R-42 bass reflex speaker, excellent condition. Also have tube tester, VTVM, and sig. generator. Bill Brandick, 4821 North 18th Street, Philadelphia 41, Pa.

SELL OR TRADE—Two LS104 Sig. Corps trumpets with matching transformers, 25 watt rating each. Other items. Hosea E. Decker, 1858 Rural Avenue, Huntington, W. Va.

FOR SALE—Seeburg, 78 rpm record changer, 10-12", 12-10" records, with L-70 crystal. Also adapter made by American Microphone Co., will play 33⅓ and 45 rpm. Micro needle included. All for $25. L. Glenn Royce, 120 E. Pamona St., Philadelphia, Pa.

WANTED—Will buy quantity war surplus low impedance input to grid transformers; Varo- 300514 and 300519 or similar small sized mic to grid transformers. State quantity and price, impedance ratio and size. Garwin Theatre Equipment Corp., 3817 Washington Blvd., Cleveland 18, Ohio.

SELL OR TRADE—Experimenters television kit, 22 tube, complete with all parts, tubes, xfmrs, punched chassis, 5" picture tube. Original cost $100, first reasonable offer takes it, or trade for Hallicrafter receiver. Barney Radio, 10209 Mt. Auburn Ave., Cleveland 4, Ohio.

SELL—Millen exciter, excellent condition, with tubes and coils for 10m and 20m, $25. With components for 600V power supply, $30. Also perfect Sunar XE-10, NBFM, $20. J. Abramowitz, 118 Clara St., Brooklyn 18, N. Y.

WANTED—NRI or Sylvania tube tester. Also want used correspondence course in radio and TV. H. G. Radcliffe, 1013 W. High St., Petersburg, Va.

WANTED—A set of Rider's Manuals from 1 through 15, or more, in excellent condition. Nelson Frieberg, 302 Eastwood Ave., Ithaca, N. Y.

WANTED—Radio test equipment, Rider's Manuals, Sam's Folders, surplus tubes. Describe fully. Rudolph F. Chaloupka, Jr., 1429 South 58th Court, Cicero 50, Ill.

FOR SALE—Supreme Model 542 VOM, 5,000 ohms per volt, complete with instructions and test probes, very good condition, $12.50 FOB. R. H. Ives, 81 Ericsson St., Portsmouth, Va.

FOR SALE—Radio City Products model 8573 "Serviceshop" Multitester, combines tube, set, battery, and condenser tester with AM-FM audio signal generator. Costs $98 new. Will sell with or without signal gen. unit. Harry Chu, 110 Mulberry St., N. Y. C.

SWAP—Zeiss Ikon 3.5 with 300 shutter speed, Vogtlander, telescope, etc., for wire or tape recorder, etc., or what have you? Dean Matthews, 1004 Coventry Rd., Decatur, Ga.

FOR SALE—National Radio Institute All-Wave, All-Purpose Tester, model 1175B. Good condition, complete with batteries and instruction manual. Norman Nelson, Mahnomen, Minnesota.

SWAP—Double 40 watt fluorescent lamp fixture with lamps. Want VOM or what have you? Clinton Weddle, P.O. Box 265, Bassett, Va.

FOR SALE—One Jerrold TV booster and one Regency TV booster. Both working condition, $15 each. Raymond Conover, Stone Ridge, New York.

FOR SALE—VM Model 400 intermix record changer, equipped with Astatic QT cartridge, first class condition, $13.50 FOB. Albert R. Hodges, 353 Brooklawn Drive, Rochester 18, N. Y.

FOR SALE—Rider Vol. 1, $5. H. A. Nickerson, 435 N. Main St., Sharon, Mass.

FOR SALE—National NC-33 rec., used very little, $35. Also 500V and 275V output 12V dynamotor, $5, or what have you? A. Swenson, Jr., Pines Lake (East), Box 243, Paterson R.D. 1, N. J.

WANTED—Manual for BC-348-M receiver. Also complete diagram information for changes to separate RF and AF Var. controls, noise eliminator and changing the 41 output tube. State price. Karl Friedrich, 7535 Watson St., Philadelphia 11, Pa.

FOR SALE—Sam's Photo Facts, Vol. 1 to 7, in binders, $100. Alex Atkinson, 15391 Woodincham, Detroit 21, Mich.

FOR SALE—Power supply for portable radio with 2 rechargeable storage batteries (1 spare), $8.50. Eric Scholer, Box 191, East Durham, N. Y.

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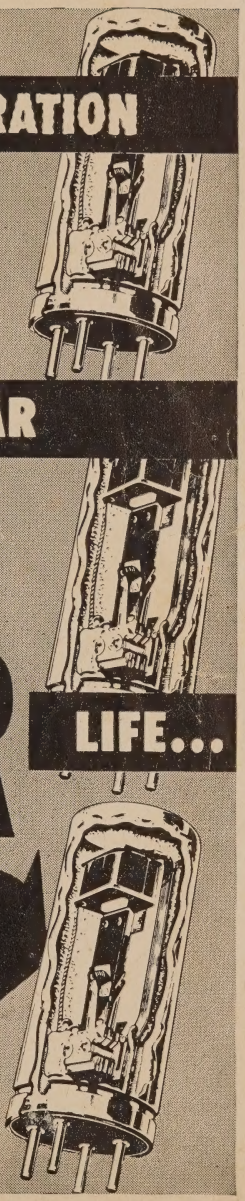

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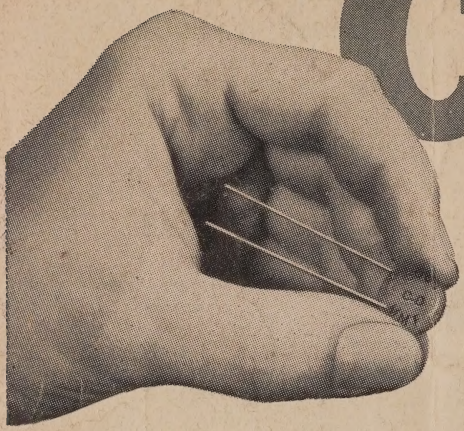

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